ACR-Based Retrievals for AMSR-E Validation

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Active/Passive Retrievals

- We are developing a family of radar-based retrievals at CSU
- Retrievals use radar alone or radar combined with one or more passive instruments
- Retrievals use an estimation theory framework (e.g. Rodgers 1976, 2000)
  – Explicit specifications of uncertainties and a priori information
  – Error estimates for all retrieved and derived quantities
  – Influence of measurements vs. a priori based on specified uncertainties
- Synergy between AMSR-E, GPM, CloudSat, etc. has driven multiple applications

Application to AMSR-E validation

- Quantitative validation will largely be correlative, comparing results from several retrievals using independent instruments or algorithms
- Retrieval candidates
  - LWC retrieval (ACR, ACR-MODIS, ACR-AMSR)
  - IWC retrieval (ACR, ACR-MODIS, ACR-AMSR)
  - Light rain retrieval (ACR, ACR-AMSR)
  - Snow retrieval (ACR, ACR-AMSR, ACR-MIR)
 - More complex mixed cases to be attempted later

Cloud Liquid Water Retrieval

LWC Retrieval Inputs, 19 January 2003
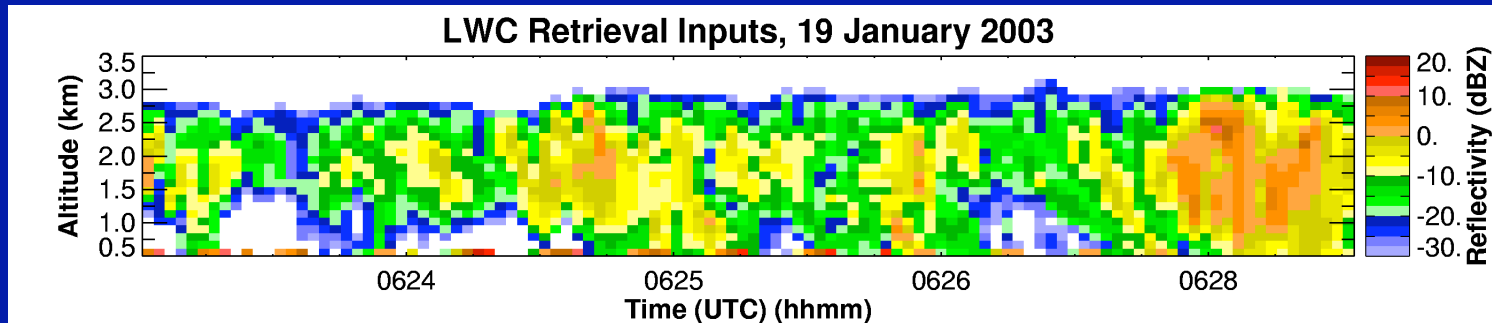
- Assumes lognormal drop size distribution

- Assumes number density N_T and width parameter σ_{log} are constant in height

- Retrieves profile of particle size r_g, plus values of N_T and σ_{log} $\Rightarrow$ From these, LWC and effective radius may be derived

- Designed for drizzle-free particle distributions

LWC Retrieval Outputs, 19 January 2003

Retrieval of Snow

Snow Retrieval Inputs, 29 January 2003
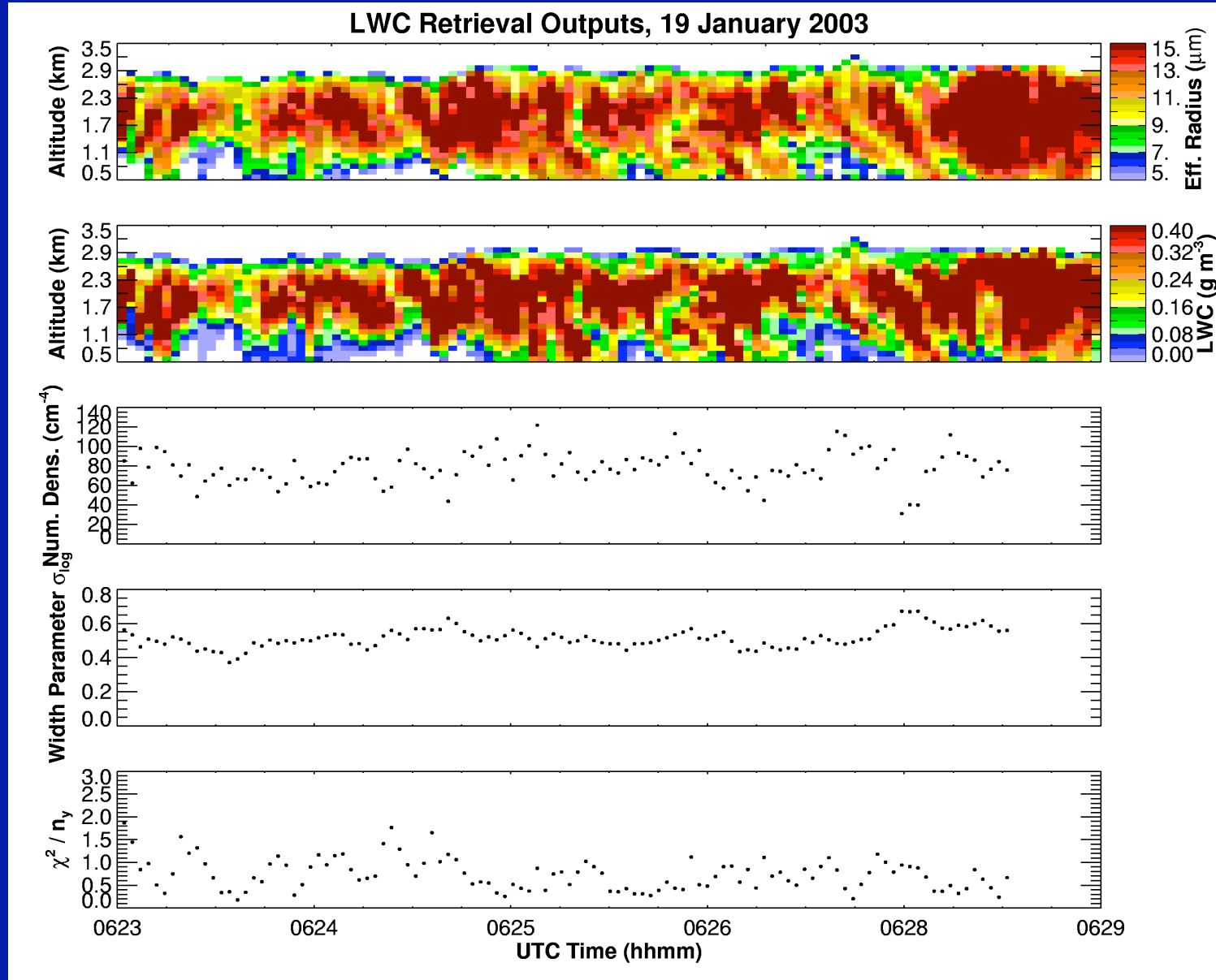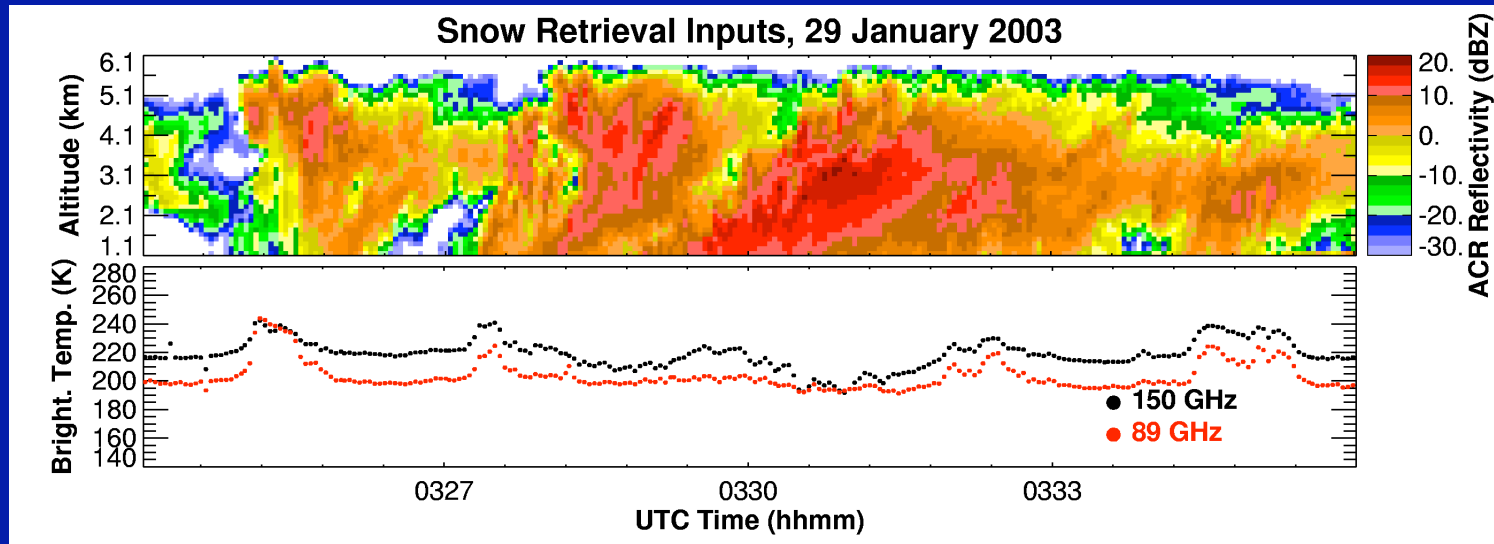
- Very preliminary! Based on combination of ACR (95 GHz radar) and MIR/PSR passive (89/150 GHz)

- Assumes exponential distribution $N(D)=N_0\exp(-\Lambda D)$

- Assumes N_0 constant in height

- Retrieves profile of distribution parameters $\Rightarrow$ snow rate

Snow Retrieval Outputs

Snow Retrieval Outputs, 29 January 2003
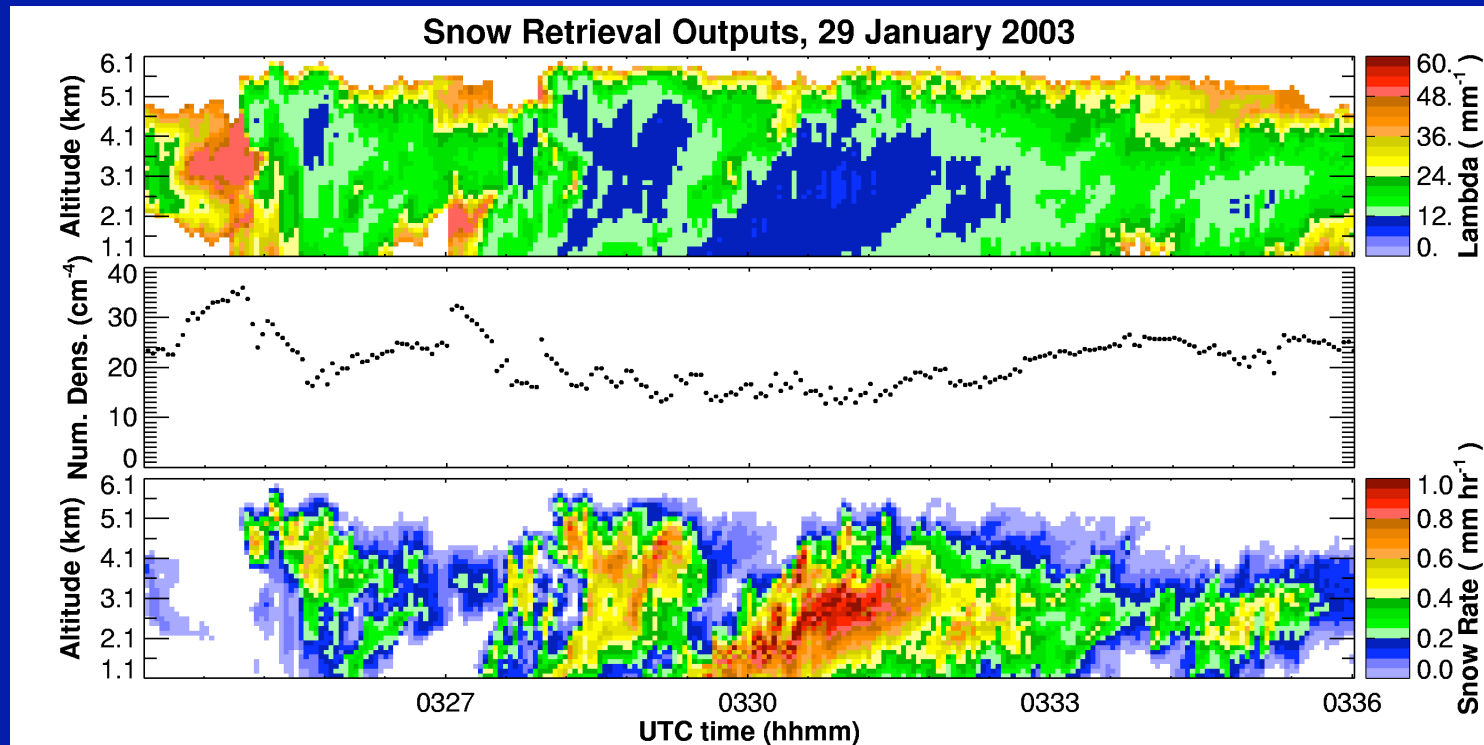
Upcoming Activities

- Apply LWC and IWC retrievals to Wakasa Bay flight legs where appropriate

- Light rain retrieval (next speaker)

- Comparison to other AMSR products

- Snow retrieval

- Study methods to bridge the cloud-precip gap (e.g. drizzle)